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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,993	07/23/2001	Susan Davis Allen	FSU-0003	1378

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EXAMINER

KORNAKOV, MICHAIL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 09/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/909,993

Applicant(s)

ALLEN, SUSAN DAVIS

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17-47 and 66 is/are pending in the application.
- 4a) Of the above claim(s) 4, 5, 7, 12, 13, 19 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 8-11, 14, 15, 17, 18, 20, 22-37 and 66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-15, 17-37 and 66 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-15, 17-37, and 66 are currently pending. Claims 4, 5, 7, 12, 13, 19, 21 are withdrawn from consideration as being drawn to a non-elected invention. Claims 1-3, 6, 8-11, 14, 15, 17, 18, 20, 22-37, 66 are examined on the merits.
2. Applicants' amendments and remarks have overcome rejections under 35 USC 112, first and second paragraphs, and the rejections are, therefore, withdrawn.
3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1-3, 6, 8-11, 14, 15, 18, 20, 22-26, 31, 35, 37, 66 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tam et al (J. Appl. Phys., Vol. 71, No. 7, 1 April 1992).

Tam teaches laser cleaning techniques, utilized in semiconductor industry for the removal of sub-micron size particles from semiconductor surfaces. The teaching of Tam includes selecting an optical radiation source, such as KrF or YAG lasers, having an optical energy distribution; determining a composition (water or alcohol or their mixture) with defined thickness (a few microns, page 3519, left column) and geometry (a film, page 3519, left column) to serve as an energy transfer medium for said optical radiation source having said optical energy distribution; determining an optical pulse of said optical radiation source, while employing the said energy transfer medium and irradiating particles deposited on the sample surface by transferring energy from the

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optical radiation source through the energy transfer medium, thus dislodging the particles from the surface. Regarding the recitation of the instant claims, concerning with "minimizing damage to the sample", it is noticed here that Tam discusses the possible damage to the substrate and provides conditions to eliminate or minimize such damage. Regarding the limitation of claim 1, which is concerned with selecting laser energy transfer parameters base on a composition of the particle(s) to be removed, Tam teaches that the laser fluence is chosen depending on the types of contaminants to be removed and on the substrate damage threshold (page 3522, summary). Regarding the instant claim 6, Tam teaches the pulse length and shape of the laser pulse at page 3518 under heading 1 and illustrated in figures 3 and 4.

As to claim 3, 8, 9 and 10 disclosing that the laser energy transfer parameters comprise the wavelength of the laser energy figure 3 disclosing 248 nm and 10.6 micron wavelength; the density of the laser energy, the pulse length and shape of the laser energy, the pulse repetition rate of the laser energy, and the laser beam size and/or shape, and the irradiation geometry of the particle(s)/substrate/energy transfer medium are inherently present in the teaching of Tam. Since the values of size and shape of the beam are not currently elucidated, the beam of Tam will have a size and shape, and is disclosed to have a pulse repetition rate. Figure 4 and relevant associated text details the use of a Moly mask for the laser and various other beam property control elements. The temperature where the cleaning is performed is the ambient.

As to claims 14, Tam discloses experimenting with different solvents in order to ascertain the best result. Figure 3 illustrates different coupling scenarios.

Regarding the limitation of the instant claim 37, which is concerned with absorption of radiation pulse largely by energy transfer medium, but not significantly by the sample, Tam teaches the implementation of such cleaning technique in the abstract and by indicating the expectation that film-enhanced laser cleaning works the best when the laser wavelength is chosen for strongest absorption by the liquid film (page 3520).

Regarding the specificities of claim 66 see also Fig.3 and page 3518 et seq.

Regarding the claim 17, the processing parameters of Tam are selected based on a specific application (removal of sub-micron size particles from semiconductor surfaces) and implemented in a specific environment, wherein arrangement for liquid film enhanced pulsed laser cleaning equipment was accommodated.

With regard to the limitations presently introduced by Applicants reciting "wherein the predetermined removal threshold is greater than forces adhering the one or more particles to the surface and less than a damage threshold of the substrate" it is noted that such limitation is inherently and necessarily present in Tam, since the removal of the particles described by Tam is only possible when the adherent forces between the particles and the surface are overcome, which is only possible when the removal forces is greater than the forces of adherence of particles to the surface. Thus the removal forces being greater than adherence forces is clearly envisaged by Tam. In the event that one skilled in the art would not clearly envisage such, it would have been obvious to those skilled in the art that in order to remove the particle from the surface the forces of removal should be clearly greater than the forces of attraction between the particles to be removed and the surface in order to achieve such result. .

5. Claims 28,29,33,34,36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam et al (J. Appl. Phys., Vol. 71, No. 7, 1 April 1992).

Regarding the limitations of claims 28 and 29, Tam discloses depositing energy transfer medium onto the substrate (page 3519), however remains silent about specificities of depositing equipment, which are indicated in the instant claims 28 and 29. However, it is noticed here that if the operation is known in reference to the object or process, the invention of the new machine for performing it does not make a new process, but only a new instrument for applying it.

Regarding the specific limitations of claims 33,34,36, Tam remains silent about some particularities, disclosed in these claims, such particularities to include; selecting a composition, thickness and geometry of the energy transfer medium based on a composition of the particle(s) to be removed; determining an optical energy distribution of an optical radiation source based on the optical characteristics of a surface of a sample or particle(s) to be removed from the sample. However, Tam clearly motivates the skilled artisan to implement such particularities by indicating that some degree of empirical optimization of the liquid type to be used for laser cleaning of various substrates with various types of particles (page 3522, F). Tam also motivates the skilled artisan to consider the optical characteristics of a sample or particle(s) by discussing the optical characteristics of a solid surface, being very absorbent or opaque. Therefore, one skilled in the art motivated by the teaching of Tam would have found obvious to select a composition, thickness and geometry of the energy transfer medium based on a composition of the particle(s) to be removed and determining an optical energy

distribution of an optical radiation source based on the optical characteristics of a surface of a sample or particle(s) to be removed from the sample in order to optimize and provide efficient cleaning conditions in the method of Tam.

Response to Arguments

Applicant's arguments filed 06/21/2005 have been fully considered but they are not persuasive. The crux of Applicants arguments with regard to the presently amended claims appears to hinge on the "range" of the predetermined removal threshold that is allegedly not disclosed or suggested by Tam. It is first noted that such threshold is either anticipated as being inherent for the process of Tam, or is obvious to those skilled in the art since the removal of particles from the surface can only be achieved if the particle removal forces are greater than the forces of attraction between the particles and the surface. This issue is discussed in the body of rejection and is incorporated herein in its entirety. It is also noted that the "range" which applicants relies upon in their arguments is NOT claimed in the instant claims. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the removal threshold, as recited in the specification on page 13) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Thus, Applicants arguments are much more specific than the claims. Specifically almost entire Applicants' argument recites the numerical limitations on the removal

threshold from different pages of the instant specification. The instant claims, however, do not recite a single numerical value of such threshold.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "M. Kornakov", with a long, sweeping horizontal stroke extending to the right.

Michael Kornakov
Primary Examiner
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September 4, 2005